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A new species of *Bronchocela* (Squamata: Agamidae) from Nicobar Island

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Abstract. A new species of the genus *Bronchocela* from central part of Nicobar Islands is described. It is similar to *B. cristatella* but differs by having a red gular patch in males, fewer scale rows around midbody and only up to 3 dorsal body scales rows pointing upwards. It was found on seven islands of the central part of Nicobar but not in the northern or southern part of the archipelago. A colonization scenario of the Nicobar Islands by the genus *Bronchocela* is discussed. An arrival of an ancestor from Sumatra through the Great Channel is more probable than from north through the Ten Degree Channel by island hopping.

Key words. Squamata, Agamidae, Draconinae, *Bronchocela*, new species, India, Nicobar archipelago.

INTRODUCTION

The genus *Bronchocela* comprises nine species distributed in South East Asia, the Indo- Australian Archipelago, the Philippines and in western New Guinea (WERMUTH 1967, DE ROOIY 1915, DIONG & Lim 1998, HALLERMANN 2005). Recently a taxonomic review of the genus was published including biogeographical data was given for each species (HALLERMANN 2005).

The Andaman and Nicobar Archipelagos are politically part of India. The herpetofauna of the Andaman Islands is considered to be of Chinese-Indian affinities, resulting from the connection of these islands to the mainland during late Pleistocene glaciations with sea level lowering of about 100 m. On the other hand, Nicobar Islands are considered to be of volcanic origin, with Indo-Malayan affinities (DAS 1999). Its fauna established mainly through waif dispersal across the Great Channel from Sumatra. For the size of land area the islands of central Nicobar show the highest proportion of endemic snake species (DAS 1999). DAS (1999) summarized the history of herpetological exploration from its beginning in the middle of 19th century to the late 1990ies. The inventory of the Nicobar herpetofauna was relatively poor until the 1960ies. An expedition of the Zoological Survey of India in the 1960ies, however, increased our knowledge of the herpetofauna of the Nicobar Islands. TIWARY & BISWAS (1973) described *Bronchocela danieli* from Great Nicobar. Indraneil Das, during several field trips between 1994 and 1998 discovered new species and country records and clarified problematic species records e.g. *Pseudocalotes archiducissae* Fitzinger, 1861, a nomen nudum, as *Bronchocela cristatella*. Other species such as *Calotes calotes* reported by BLYTH (1863) as *C. ophiomachus* and by SMITH (1935) as well as *Calotes jubatus* could not be verified to exist on Nicobar, since no voucher specimens exist (DAS 1999, 2000). DAS (1999) presented the currently most complete list of amphibians and reptiles from the Nicobar Islands. *Bronchocela cristatella* is known to occur on several islands in the north and south of Nicobar (BISWAS & SANYAL 1980). *B. danieli* is restricted to Great Nicobar (see Fig. 1). S. P. Vijayakumar studied the herpetofauna of Nicobar Islands in his PhD Thesis. On several islands of the central Nicobar a lizard of the genus *Bronchocela* occurs which differs morphologically from the common *B. cristatella* and all other species of this genus. It was found on Katchal Island, Trincat Island, Camorta Island, Nancowry Island, Bompoka Island, Tarassa (Teressa) Island and Chowra Island.

It is more similar morphologically to *B. cristatella* than to *B. danieli*, but differs from it in several characters. A comparison with all other species of the genus shows that it represents a new species which I describe below.

Fig. 1. Map of Nicobar Islands. Black coloured islands illustrate occurrence of *B. rubrigularis* sp. nov.

MATERIAL AND METHODS

The specimens examined for this study are listed in the appendix. Museum acronyms follow LEVITON et al. (1985). The following data were recorded: Snout-vent length (SVL), tail length (TL from cloaca to tip of tail, if tail was complete), head length (HL, between tip of snout and hind border of tympanum), head width (HW, at angle of jaw), number of supralabials (SL, on each side) and infralabials (IL, on each side), number of scale rows around midbody (M), hind limb length (HLL, from groin to tip of fourth toe, without claw), foot length (FL, without claw), as well as the ratios TL/SVL, HLL/SVL, HW/HL. In several specimens diameter of the tympanum and orbit, and the ratio of the two as well as the number of scales between the nasal scale and anterior border of orbit along the canthus rostralis, were also checked.

Bronchocela rubrigularis sp. nov.

Holotype. ZMH R09271 (Fieldnumber Tri 25) (see Fig. 2). An adult male collected by S.P. Vijayakumar on Trinkat Island, central Nicobar Islands, Nicobar in 2004.

Paratype. ZMH R09272 (Fieldnumber Kat 43). A subadult male, (Katchall Island), central Nicobar Islands, same collector as holotype. Six paratypes will be inventoried at ZSI: Fieldnumber BOM 21: Bomboka Island; Fieldnumber NAN 15: Nancowry Island; Fieldnumber CAM 76: Camorta Island; Fieldnumber TER 39: Teressa (Tarassa) Island); Fieldnumber CHO 05: Chowra Island: Fieldnumber BOM 27: Bomboka Island.

Diagnosis. A relative robust species with a SVL of 81–106 mm, and a long tail (280–377 mm (336–378 % of SVL). Tympanum large, more than half diameter of orbit, often dusky coloured, Ratio tympanum /orbit 0.74–0.89. Head covered above with small keeled scales, up to two slightly enlarged scales between orbit and tympanum. 7–10 supralabials and infralabials on each side. Canthus rostralis sharp, two small erect, compressed scales behind supraciliary edge. Nuehal erest formed by 7–10 lanceolate erect scales, bordered laterally by smaller erect scales, longest little longer than diameter of orbit. Dorsal erest smaller than nuchal crest, continues nuchal crest by a small gap. Mental wider than high, three postmentals, gular sac small in males, gular region covered with little enlarged keeled scales, smaller than ventrals.

Body scales mucronate, keeled, homogenous in 52–58 midbody scales. 1–3 uppermost scale rows next to dorsal crest pointing upward, 4–5 rows directed parallel, others scale rows directed downwards. Ventrals about two times larger than dorsals, strongly keeled. It ean be distinguished from other congeners of the Nicobar Islands: from *B. cristatella* by a larger nuchal crest, only 1–4 upper scale rows pointing upwards (versus 5–10), and a red gular patch (white in alcohol) in males; from *B. danieli* by a larger tympanum (versus only half diameter of orbit) , longer fifth toe than fourth finger (versus fifth toe smaller than fourth finger) and only two times larger ventrals (versus five times larger)

Colouration. In life: Known for males only: body green to brown above, head light green to light brown, upper side of head sometimes mottled with red, tympanum blaek, orbit with a blue ring around eye, in some males body same colour as head (light brown), ventral side light to yellowish green with a V-shaped red patch on gular (Figs 3–6).

In alcohol: Males are dark brown to nearly black above, lighter brown on venter and on lower side of legs. A notably white, triangular patch (apex directed rostrally) on the gular region

Description of holotype (ZMH R09271, Fig. 2). Snout vent length 106.4 mm, tail length 377 mm, 355 % of SVL (original tail broken and separate), hind limb length from base of femur to tip of 4th toe (without claw) 88 mm, foot length to tip of fourth toe: 34 mm, length of toes (without claws) 1–5 in mm: 5.7 / 9.4/ 18.2 / 21.7 / 14.9, length of fingers 1–5 in mm: 3.8 / 7.3 / 13.2 / 13.0 / 7.7, head

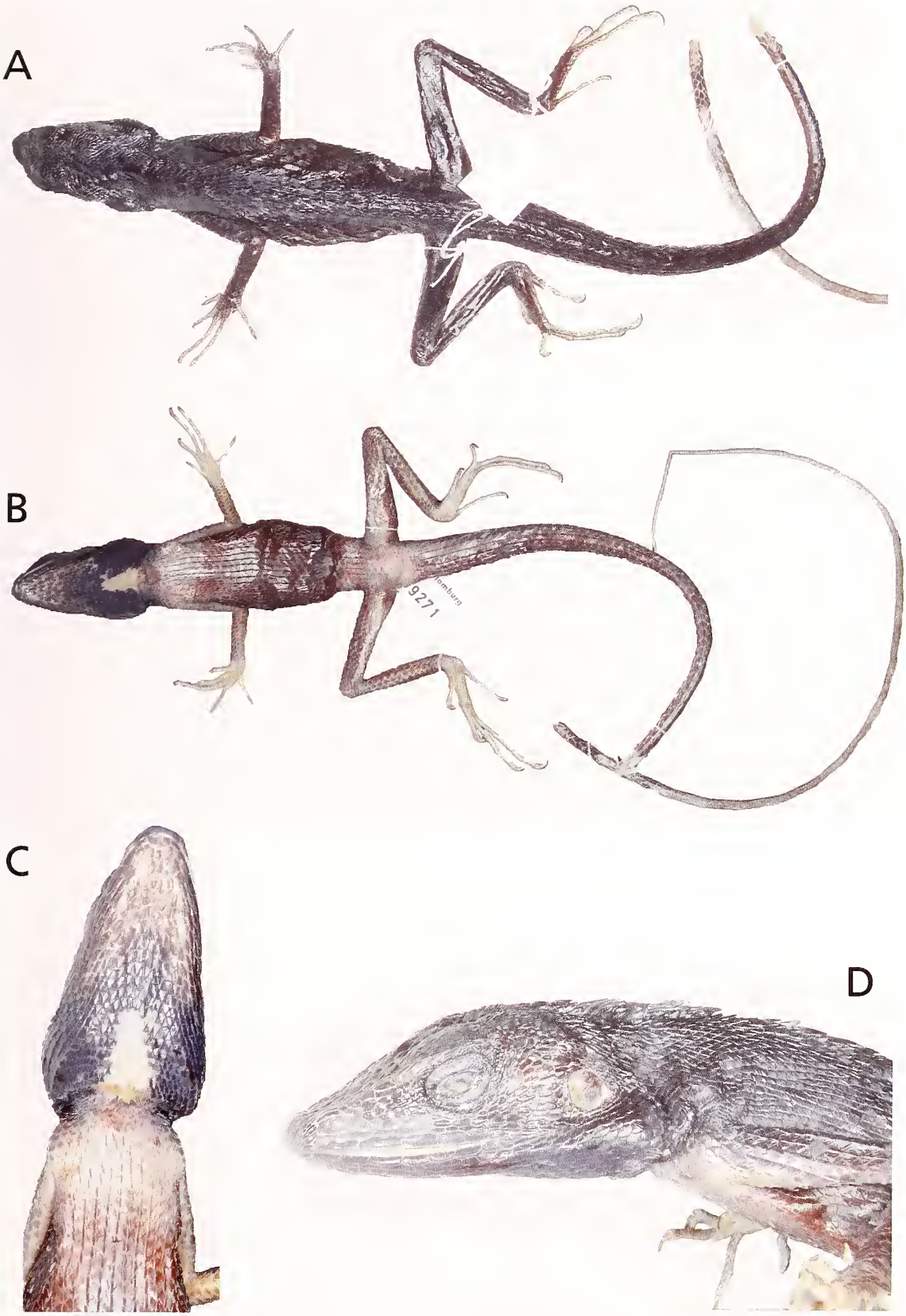

Fig. 2. Preserved holotype of *Bronchocela rubrigularis* sp. nov. (ZMH 9271). A= complete holotype in dorsal; B= complete holotype in ventral; C= head in ventral view; D= head in lateral view. Photo: J. Hallermann.

Fig. 3. *Bronchocela rubrigularis* male in life from Camorta Island. Photo: S.P. Vijayakumar.

Fig. 4. *Bronchocela rubrigularis* same specimen as in Fig. 5, showing red gular patch. Photo: S.P. Vijayakumar.

width in temporal region 16.0 mm; head length from tip of snout to hind margin of tympanum: 30.4 mm. 9 upper labials and 8 lower labials on each side. Diameter of orbit 4.84 mm, diameter of tympanum 4.34 (ratio: tympanum/orbit 0.89). Head concave, covered above with small uniform keeled scales, two slightly enlarged scales intermixed on an upper line between orbit and tympanum 5 scales between nasal and anterior border of orbit along canthus rostralis. Mental wider than high, followed by three postmentals. Gular region covered by keeled scales, gular sac small, covered with little enlarged keeled scales, smaller than ventrals. A skin fold stretches from angle of mouth to insertion of foreleg. Nuchal crest formed by 10 lanceolate erect scales, bordered laterally by smaller erect scales, longest little longer than diameter of orbit. Middorsal scale row forming a small dorsal crest by triangular erect scales, which is lower than nuchal crest, separate from from it by a small gap. 54 scale rows around midbody, dorsal and lateral body scales small, mucronate, keeled; 2 uppermost scale rows directed upwards, next 5 below parallel to middorsal scale row, other dorsoventral scale rows directed downwards. Ventrals about two times larger than dorsals, strongly keeled. Limbs relatively strong, covered by keeled scales.

Coloration. Coloration in life not known for holo- and paratype, but supposedly green body colouration. In alcohol (Fig. 2): upper side of body and head dark brown to almost black. A white gular patch, V-shaped, apex di-

Table 1. Measurements and scale counts of *Bronchocela rubrigularis* sp. nov.

specimen no	SVL	TL (% of SVL)	sex.	M	ear	orbit	SL/IL	HL.	HW	HW/ HL	HLL	FL	HLL/SVL %	remarks
ZMH R09271 holotype	106.4	377 (354)	m	54	4.34	4.84	9 9/8 8	30.4	16.0	0,52	88	34	82,7	Tail broken
ZMH R09272 paratype	80.3	304 (378)	m sad	58	3.51	4.39	9 9/8 9	23.3	13.0	0.55	68.6	28	85.4	
BOM 21	81.9	-lost	m	55	3,34	–	9 9/9 8	–	11.9	–	75.6		92,3	Nuchal crest 9
NAN 15	83.4	283 (339)	f	52	5.1	–	8 7/9 7	–	12.8	–	71.8		86.0	Eggs no gular patch
CAM 76	85.4	-lost	m	55	3.88	–	9 8/10 10			12.8	–	77.9	91.2	No patch ?
TER 39	85.3	287 (336)	m	56	2.8	–	9 10/9 10			12.7	–	78.2	91.6	Red patch
CHO 05	86.5	205 (reg.)	f	52	3.46	–	9 9/9 10		13.0	–	76.2		88.0	Pale gular patch
BOM 27	85.4	290 (339)	f	58	3.82	–	10 10/ 10 10		12.7	–	80.0		93.6	Eggs no gular patch

Snout-vent length (SVL), tail length (TL from cloaca to tip of tail, if tail was complete), head length (HL, between tip of snout and hind border of tympanum), head width (HW, at angle of jaw), number of supralabials (SL, on each side) and infralabials (IL, on each side), number of scales around midbody (M), hind limb length (HLL, from groin to tip of fourth toe, without claw), foot length (FL, without claw), as well as the ratios TL/SVL, HLL/SVL, HW/HL. In several specimens diameter of the tympanum and orbit.

Fig. 5. *Bronchocela rubrigularis* male in life, from unknown locality in central Nicobar in green morph. Photo: S.P. Vijayakumar.

rected rostally. Tympanum dark, lower side of body between fore legs, underside of upper and lower legs and region around cloacae light brown, lower side of hands and foots whitish. Venter and lower side of tail brown.

Variations (see table 1). Females differ from the holotype by a lower nuchal crest, and by the lack of a red gular patch. One female has a pale gular patch and one subadult male has no gular patch. Tail length varies (280–377 mm [336–378 % of SVL]). Body colouration varies (see diagnosis). Body colouration (in alcohol) of venter and ventral side of legs and tail of paratype (ZMH R09272), subadult male, is very similar to the holotype. Scalation (see table 1) is similar. The nuchal crest is lower, no enlarges scales are present between orbit and tympanum.

Fig. 6. *Bronchocela rubrigularis* male in life, from Trincat Island in brown morph. Photo: S.P. Vijayakumar.

Distribution. The new species is only known from the seven island of Central Nicobar (Fig. 1), and its distribution seems to be restricted to Central Nicobar.

Etymology. The species is named after its red gular (latin rubber = red, gula (feminin) = gular)

Discussion

Bronchocela rubrigularis sp. nov. was observed and collected on several islands of Central Nicobar (Katchal Island, Trincat Island, Camorta Island, Nancowry Island, Bompoka Island, Tarassa Island and Chowra Island) while it is missing on the northern group (Carl island) and southern group of the Nicobar (Little and Great Nicobar). Pattern of distribution suggests that the new species is restricted to the central region of Nicobar. While *B. cristatella* occurs in the northern part, *B. danieli* was only recorded on Great Nicobar. From a biogeographical viewpoint it is important to know about geological history of Andaman and Nicobar Archipelago. Andaman and Nicobar are both parts of the Sunda Land and not of the Indian Subcontinent (Das 1999). During glacial sea-level lowering in the Pleistocene (about 120.000 years ago) a land connection between Birma (Myanmar) and Andaman Archipelago existed. On the other hand, the Nicobar Islands were isolated during all times by the Great Channel from Sumatra in the southeast and by the Ten Degree Channel in the north. It is more plausible that a faunal colonization has occurred by dispersal through the Great Channel from Sundaland than by island hopping from north via Andaman since *Bronchocela* is missing on Andamar Island and Myanmar (Das 1999). I can not yet estimate the time of arrival of a *Bronchocela* species on Nicobar nor can I resolve the genetic relationships as long as molecular data are still lacking

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Appendix: Material examined

Bronchocela rubrigularis. India: Nicobar Island: Trincat Island (ZMH R09271 (field no Tri 25) holotype); Katchin Island (ZMH R09272 (field no Kat 43) paratype), Bompoka Island (No catalogue no. (field No. BOM 21)); Nancowry Island (No catalogue no. (field NAN 15)); Camorta Island (No catalogue no. (field no. CAM 76)), Teressa (Tarassa) Island (No catalogue no. (field TER 39)); Chowra Island (No catalogue no. (field no. CHO 05)), Bompoka Island (No catalogue no. (field no. BOM 27. ***Bronchocela cristatella.*** Indonesia: Sumatra: Serdang 3°30'N 98°50'E (ZMH R0608; R05602-3); NE Sumatra: Kwalu (ZMH R05623), Sumatera Barat: Indrapura 2°04'S,100°56'E (ZMH R05600);Tandjong: Padang District 0°38'S 100°52'E (ZMH R05624); Environs of Pispis 3°10'N,99°01'E, mountain region (ZMH R04928-9); Pulo Weh Island: Sabang (ZMH R05625); Indrgiri: Riau: Sungei Lalak 0°27'S 102°59'E (ZMH R06075-6); Nias Island (ZMH R04893-5).